Technical Notes

Small Numbers

Presentation and interpretation of statistics compiled for relatively small populations, or when there are a small number of events in a population, present several challenges. First and foremost, statistics developed for this report must preserve confidentiality. Breaches of confidentiality are usually more of an issue when the population for which the data are developed is relatively small.

A second concern involves interpreting data based on a small number of events irrespective of the size of the population, because random fluctuation can be relatively large when the number of events is small. Because of these random fluctuations, rates based on small numbers might not be as stable as those based on larger numbers and so they can have limited precision. For example, in 1996 there were 9 infant injury-related deaths in Washington State, for an infant death rate of 6.6 per 100,000. In 1997, there were 18 infant injury-related deaths in Washington, for an infant death rate of 15.6 per 100,000. From these two years of data, can we predict what the infant injury-related death rate will be in 1998? Not really.

This instability makes it difficult to use rates based on small numbers for program planning or assessment. In fact, considerable caution should be used in interpreting any data where the number of events is small – usually less than 20 is considered small.

To ensure confidentiality and to provide relatively stable estimates of rates, we have combined three or five years of data for rates that were calculated for sub-populations within the state, such as when presenting state-level data by age group, gender, and cause of injury. Three years of data were combined for the time trend analysis.

In the "*Circumstances Surrounding Deaths from Washington Child Death Review Data*" sections, percentages are excluded when less than 25 deaths were reviewed because including percentages when the number of events is small can limit precision and confidentiality of the data.

Comparability Ratios

When comparing trends in death rates that span a revision in ICD codes, such as that between ICD 9 (effective during 1980-1998) and ICD 10 (effective starting in 1999), any discontinuity in the trend should be considered. Ratios of the number of deaths recoded using ICD-10 to the number originally coded using ICD-9 (obtained from a study of a large sample of 1996 deaths in the United States) can assist when trying to determine whether a trend noted in the 1980-1998 period has continued in 1999-2001. The ratios are called comparability ratios.

For most causes of injury, comparability ratios have only been calculated for unintentional injuries, and for suicide and homicide by combining all causes (see table below). Because the majority, if not all, of injuries to motor vehicle occupants, bicyclists, pedestrians, and those due to drowning, falls, and fire were unintentional in nature, the comparability ratios calculated for unintentional injuries could be used as an estimate.

Cause	Comparability Ratio
Drowning	0.9965
Falls	0.8409
Fire/burn	0.9743
Firearms	N/A
Motor vehicle occupant	0.9754
Bicyclist	0.9754
Pedestrian	0.9754
Poisoning	N/A
Suffocation	N/A
Suicide	0.9962
Homicide	0.9983

For every cause of injury where a comparability ratio is available, the comparability ratio is very close to "one", with the exception of injuries due to falls. This means that the coding changes did not substantially affect mortality rates between ICD 9 and ICD 10. Therefore, the trend analyses in this report included 1999-2001, and the comparability ratios were not applied.

Time Trend Analysis Using Hospitalization Data in the Bicycle Chapter

The bicycle chapter is the only chapter with a time trend analysis using hospitalization data. Because hospitalization data is affected by changes in hospitalization practices (such as performing more procedures on an outpatient basis), it is hard to interpret the results of such an analysis. We would likely find a decline in many injury-related hospitalization rates over time, but it would be hard to differentiate how much was due to changing hospitalization practices or injury prevention efforts.

In the bicycle chapter, to minimize the effect of changes in hospitalization practices, we compared bicycle-related head injuries to other bicycle-related injuries. The objective of the analysis was to see if bicycle-related head injuries were declining faster than other bicycle-related injuries; we hypothesized that this would occur because of the increase in educational efforts related to wearing bicycle helmets.

The methods used to conduct this comparison include a poisson regression to calculate the slopes of the trend line for head injuries and other injuries, and a Students t-test to see if the slope for bicycle-related head injuries were decreasing faster than the slope for other bicycle-related injuries.

Time Trend Analysis in Child Abuse and Neglect Chapter

The number of accepted referrals to Child Protective Services have been unduplicated; that is, each child is counted only once in that year. However, unduplicated data are not available for years prior to 1998. Because only four years of unduplicated data are available, it was not possible to do a time trend analysis.

Child Death Review Definition of Abuse and Neglect

Local child death review teams were asked to examine the circumstances in every child's life, including the child and family history of abuse and neglect. They were asked to consider whether physical abuse or neglect was a single act or omission, a pattern for that child, or a pattern in the child's family, involving more than just that child.

Local Child Death Review teams were given the definitions below, provided by the Department of Social and Health Services in 1998, to assist them in determining whether abuse or neglect was a factor in the death.

"Physical abuse" is defined as:

> The physical discipline of a child is not unlawful when it is reasonable and moderate and is inflicted by a parent, teacher, or guardian for purposes of restraining or correcting the child.

The following actions are presumed unreasonable:

1. Throwing, kicking, burning, or cutting a child.
2. Striking child with a closed fist.
3. Shaking a child under age three.
4. Interfering with a child's breathing.
5. Threatening a child with a deadly weapon.
6. Doing any other act that is likely to cause and which does cause bodily harm greater than transient pain or minor temporary marks.

"Neglect" is defined as:

An act or omission that evidences a serious disregard of consequences of such magnitude as to constitute a clear and present danger to the child's health, welfare, and safety. These acts may include but are not limited to:

1. Failure to provide adequate food, shelter, clothing, supervision or health care. Poverty and/or homelessness in and of themselves do not constitute negligent treatment or maltreatment.
2. Actions or omissions resulting in injury to or creating a substantial risk to the physical and/or mental development of a child.